

Intensive study plan for the Delta Cross Channel

Introduction

The Delta Cross Channel (DCC) is an important facility for the protection of water quality and salmon migration success. Water quality in the south and central delta can be improved (under low flow conditions) by opening the channel. Unfortunately, fish migration success is improved by closing it. In 1999, these two conflicting needs led to violations of water quality standards and subsequent degradation of protection of Sacramento salmon outmigrants, particularly the endangered spring-run yearlings.

Examination of methods to improve operations of the DCC operations to protect salmon and water quality are explicitly called for in provisions of the CVPIA and the CALFED Framework for action, as well as for implementation of the spring-run protection plan.

As part of a special meeting of the Bay-Delta Modeling Forum in February of 2000, hydrodynamic model results were presented which indicated that almost all of the water quality benefits associated with the DCC could be achieved by opening the gates only during the time when tidal stage in the Sacramento River was rising. The lag in timing between flood tides entering the central delta versus the Sacramento River produces a hydraulic gradient that forces water into the DCC only during this part of the tidal cycle. Because intrusion of salt water into the delta is greatest during the spring portion of the neap-spring tidal cycle, modeling results suggest that water quality could be protected by opening the gates during flood tides of the spring tidal cycle almost as much as keeping the gates open constantly. Thus, water quality could probably often be adequately protected by opening the gates only 25% of the time in every 2 week period.

It is unclear how much such tidal operations of the DCC would protect migrating salmon. From the available data, three alternative hypotheses regarding salmon sensitivity to DCC operations are reasonable:

1. Fish move with the movement of water. Thus, if gates are operated in such a fashion that they take as much water in 12 hours as they would in 24, the same number of fish will be diverted as if the gates were open constantly.
2. Fish move constantly downstream. Thus, if gates are closed 12 hours out of every 24, half as many fish will be diverted.
3. Fish move downstream during specific parts of the day so that the number diverted is a function of the time of tidal or solar day. There are two principal sub-hypotheses:
 - 3a. Fish primarily move downstream on ebb tides. Thus if gates are closed on the ebb and open only on the flood, fish will move past the diversion when it is closed and the number diverted will be very small.
 - 3b. Fish movement is controlled by photoperiod. Thus, if gates are closed during the time of day when fish are actively migrating, diversion of fish could be greatly reduced.

Analysis of existing datasets has failed to fully resolve fish movement patterns in the area of the

DCC, although both tidal and diel patterns have been reported.

Proposed studies.

The Delta Cross Channel Project Work Team (DCC PWT) was formed by the Interagency Ecological Program (IEP) to develop a plan of operations of the DCC for fall 2000 that would address the water quality and fishery concerns raised in the fall of 1999. The DCC PWT has attracted the involvement of a wide variety of interests and expertise. The team now proposes a series of studies and experiments that are expected to greatly reduce the uncertainties surrounding these issues and provide a solid basis both for DCC operations later this year and for the early stages of CALFED implementation.

The following is a brief overview of the proposed studies. More detailed descriptions are attached.

Hydrodynamics

Rick Oltmann and Jon Burau of USGS and Chris Enright and Howard Mann of DWR propose to place a series of velocity meters in the Sacramento River near the DCC, within the DCC, and east of the DCC at two sites in the Mokelumne River. These meters will give a detailed description of the flow structure encountered by fish as they traverse the confluence of the Sacramento River and DCC, and will provide flow information in all the important channels of the DCC region.

The meters will be in place by the middle of August in order to be able to calculate the net flows by early September when the water quality studies begin.

The proponents have described four separable tasks within this topic area. Total costs for all four are estimated to be \$65K.

Water Quality

David Briggs of Contra Costa Water District has proposed a series of operational conditions for the DCC for nine weeks beginning one week after the Labor Day weekend. The EC meters presently in place at Chipps Island and Jersey Point will permit analysis of the degree of salinity intrusion by examining the change in the ratio of EC at the two sites.

The proposed DCC operations are:

open gates for three weeks from September 6 to September 27.

open gates at the end of every slack low tide in the Sacramento River and close them at the start of the slack high water for three weeks from September 27 to October 18.

Close gates for three weeks from October 18 to November 8 (this is the least necessary condition for the study and can be aborted if salinity rises to levels of concern).

Costs for this study are limited to the costs of personnel and gear required to operate the gates in a tidal fashion for three weeks. The Delta Mendota Water Authority (which has the contract to manage the gates) has estimated that these costs would be \$800 per day of tidal operation). All relevant EC data are presently telemetered as part of the compliance monitoring network.

Salmon smolt mass tagging

Mark Pierce and Erwin Van Nieuwenhuyse of USFWS Jim White of CDFG, and Rick Sitts of Metropolitan Water District propose two releases of marked fish upstream of the DCC. Midwater trawls will be performed in the Sacramento River downstream of the DCC and in channels east of the DCC to monitor the movement and timing of fish at this flow split. 160,000 smolts are available from the Mokelumne River hatchery. The fish will require some temporary marking to allow rapid identification upon recovery. Releases of marked fish will occur on November 8th and 15th. Trawls to recover the released fish will proceed constantly for 48 hours following each release.

For this study (and the next) DCC gates would be open from November 8 through November 22. Costs are estimated at \$35K.

Salmon smolt/yearling radio tagging

Dave Vogel of Natural Resource Science Inc. (NRSI) has been performing radio tag tracking of fish in the delta under contracts from EBMUD and CVPIA. NRSI proposes studies to follow fish movement near the DCC that would be brief and intensive. Radio tagged fish will be released near the release site of marked fish after the cessation of downstream sampling and will continue for two days between the release site to downstream of the DCC in the Mokelumne and Sacramento rivers (probably November 13th and 14th and again on November 20th and 21st).

Adult salmon radio tagging

Dan Odenweller of CDFG is leading a program that catches and radio-tags adult, upmigrating salmon at Jersey Point on the San Joaquin River, as part of an investigation into the migratory paths of adult salmon through the south delta. Some of the fish that he catches are probably of Sacramento or Mokelumne stocks. Four additional stationary transceivers to record the passage of radio-tagged fish are available for use this fall. Dan proposes placing these on the north and south forks of the Mokelumne as well as near the DCC and in the mainstem Mokelumne. These transceivers would allow identification of the routes and fates of adult salmon that might be drawn into the central delta by diversions through the DCC.

Estimated costs of installing and monitoring the additional transceivers are \$5K. Dates of this study are still being arranged.

Expected products

At a minimum this effort will produce:

1. Recommendations for operations of the DCC gates from November 22 to January 31 in a fashion that optimizes salmon protection while preserving water quality in the central and south delta.

2. Report of findings that will serve as the basis for CALFED studies of the DCC and the proposed Hood-Mokelumne connector.
3. Article summarizing results for a general audience in the winter or spring 2001 IEP Newsletter.